

# RESEARCH HIGHLIGHT

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## ABORIGINAL HOUSING: LOCAL MATERIALS AND DESIGN PREFERENCES

Traditionally, the dwellings of Aboriginal peoples were built with materials on hand and evolved with their way of life. Today, most houses in Aboriginal communities are dwellings designed for an urban, non-Aboriginal culture, built with industrially produced materials often transported from afar.

This change has given rise to two concerns expressed by many Aboriginal communities: that the design of their housing is not appropriate for their culture and that building materials are too often imported, even when local resources could be used to the benefit of the community.

This *Research Highlight* summarizes a study of these concerns. The study looked at use of local materials and housing design of local origin in a selection of Aboriginal communities.

The focus was on homegrown examples and not on demonstration projects that had been initiated or funded externally; these have already been documented. Although suitable communities were selected for studies of materials, no communities were found with suitable examples of local designs. Accordingly, the study focus shifted to needs and preferences related to housing design in communities from each of the major Aboriginal cultural regions in Canada. Also, for the purposes of this study, the idea of culture in relation to housing design was interpreted as domestic activities of daily and seasonal living.

The study documented the experiences of selected Aboriginal communities in the use of local materials for housing and the housing design needs, and preferences expressed by community members and housing administrators.

### METHODOLOGY

Information was gathered through site visits and interviews for both the local materials and design components. The method of identifying and selecting the communities for the study was a combination of literature search and word-of-mouth requests for potentially suitable and interested communities, subject to the need for cultural and geographic representation.

#### Materials

For the materials research, potential communities were identified based on a search of First Nations' websites, business success highlights and suggestions from housing technical advisers and representatives of First Nation governments. Case studies were chosen based on the existence of a significant number of buildings that had used materials from near the community.

#### Design

For the design component, communities were selected from each of the seven Aboriginal cultural regions of Canada. Economic activity, remoteness and climate were also considered, to ensure that a range of experiences would be reflected. Communities were then contacted to determine their interest in participating.

#### Site visits and interviews

Communities with homegrown use of local materials were difficult to find. Communities interested in discussing design needs and preferences were easier to find. Interview topics were faxed to the communities before the research visits to allow the interviewees time to consider the topics.





For the materials component, researchers interviewed the Chief, Band Councillors with responsibilities related to housing, paid and volunteer construction crew, and homeowners and tenants. Four communities were visited to investigate the use of three local materials:

**Brick:** Sumas First Nation (B.C.)

**Log:** Nibinamik First Nation (Ont.)

**Straw bale:** Crow Reservation and Northern Cheyenne Reservation (Montana, U.S.A.)

For the design component, interview participants included the Chief, Band Councillors and administrators with housing responsibilities, community coordinators, housing inspectors, environmental officers, homeowners and tenants, and Elders.

Researchers visited the following 14 communities:

#### **Arctic**

Hamlet of Gjoa Haven (Nunavut)

TeltitGwich'in First Nation (N.W.T.)

#### **Eastern Subarctic**

York Factory First Nation (Man.)

Kawawachikamach First Nation (Que.)

#### **Western Subarctic**

Liidlíi Kue First Nation (N.W.T.)

Fort Simpson Metis Nation (N.W.T.)

#### **Northeastern woodlands**

Membertou First Nation (N.S.)

Six Nations of Grand River (Ont.)

#### **Plains**

Piapot First Nation (Sask.)

Pasqua First Nation (Sask.)

#### **Northwest coast**

Tsawout First Nation (B.C.)

Kitsumkalum First Nation (B.C.)

#### **Plateau**

Westbank First Nation (B.C.)

Okanagan First Nation (B.C.)

## **METHODOLOGY LIMITATIONS**

The purpose of this research was to obtain baseline information with a focus on community perceptions and preferences. The methods were qualitative and relied on loosely structured interviews. The research did not include technical or economic analysis. The Chief, a Band Councillor or the housing coordinator chose the people to be interviewed.

## **FINDINGS**

### **Local materials**

Findings for each type of local material are organized under four headings: current situation, future considerations, issues and potential.

#### **Brick**

##### **Current situation**

Sumas First Nation has local clay resources and a brick plant. There are also some trained bricklayers and there is potential for others to learn this skill. While several community buildings are built with brick, few houses have used local material for construction beyond foundations and chimneys.

##### **Future considerations**

The Chief and Council of Sumas First Nation are interested in taking advantage of brick to a greater degree and believe that this would have environmental, economic and socio-cultural benefits. Chief and Council believe the benefits would include decreased environmental impacts through minimal transportation of construction materials; more money staying in the community; and increased socio-cultural health and pride when local people are employed and community houses are built with their own hands and resources.

##### **Issues**

There are few houses built of brick because of the current structure of government funding that pays for the housing units. Unit subsidies are limited and the use of brick would apparently exceed these limits. In the conventional housing market, brick carries a cost premium compared to other cladding materials.

##### **Potential**

Although the clay and shale that is the raw material may be found on or near other First Nations' land, brick has minimal application for them given the absence of processing facilities.



## Logs

### Current situation

Nibinamik First Nation has built log houses with local spruce trees since it was established in its current location in 1970. People in the area were using logs to build homes before that and have developed their own techniques. Expertise in log-building techniques is important to build long-lasting homes that perform well. While full construction skills could take up to four years to acquire, basic skills take about four months.

The community is surrounded by boreal forest and was able to selectively harvest straight trees suitable for log houses for more than 20 years. Unfortunately, a forest fire in the 1990s devastated much of the nearby forest. Suitable trees are now about 15 km (9 ¼ mi.) away, making the use of this local resource less economically feasible. While some people continue to build log homes, the First Nation government has begun building homes with imported, prefabricated materials.

### Future considerations

The Chief and Council would like to resume log building when the forest recovers or when the feasibility for travelling to harvest trees improves. Using local resources and labour was seen to have a number of advantages: a sustainable and inexpensive way to provide housing; a way to provide jobs and improve social and economic conditions in the community; a way to reduce the environmental impacts of housing; and a method of house construction that is consistent with a traditional approach that generated pride in the community.

### Issues

There has not been an economic analysis of the use of local tree resources compared to prefabricated materials. Government funding usually requires compliance with building code or established practice but building codes do not deal with log construction.

### Potential

The number of First Nations with access to suitable forest resources is not known but many communities are situated near such resources. Where nearby resources are not suitable for log construction, they could be traded with forest companies for suitable logs.

## Straw bale

### Current situation

Northern Cheyenne Reservation and Crow Reservation purchased local straw to build four straw-bale buildings: a private home, the Northern Cheyenne Literacy Center, the Muddy Hall Community Center and the Crow Study Hall. The design and layout of the buildings were developed through an iterative process with community and resident input.

The buildings were constructed with technical support from the American Indian Sustainable Housing Initiative, created by the Red Feather Development Group, a non-profit organization. Straw bales were chosen for economic viability, energy efficiency and relatively simple building techniques that allowed resident, community and volunteer participation during construction.

### Future considerations

Local organizations, including Northern Cheyenne Tribal Housing and Northern Cheyenne Tribal Council, are discussing with Red Feather the possibility of forming the first reservation-based sustainable housing program in the United States. The sustainability of the homes due to their low cost and energy efficiency is supplemented with the appeal of having a “natural feel.”

### Issues

There has not been an economic analysis of the use of local straw resources compared to prefabricated materials. Although straw was locally plentiful, the correct type of baling machine was not as close, which made extra transportation costs necessary. Straw bale construction has known pitfalls (for example, infiltration of water) that require technical expertise in construction detailing.

### Potential

Many communities are close to agricultural areas where straw is an abundant waste product from grain crops. Some construction can be completed with a combination of skilled and unskilled labour due to the low-tech requirements of straw-bale walls. Participation in the construction provides socio-cultural benefits, and potential economic benefits, if volunteer labour is used.

## Housing design

### Needs and preferences

While there were slight differences across cultures and geography, the study found that most of the housing design preferences were the same among the 14 communities visited for this research.

In 12 of the communities, it appeared that the members' design preferences had been addressed to a small extent but two communities—Six Nations and Kawawachikamach First Nation—stood out in terms of design preferences having been integrated into the housing delivery system. In other respects these two communities were quite different from one another.

Six Nations is one of the oldest established reserves in Canada, situated near several large urban areas. It is also the largest, with more than 11,000 residents.

Kawawachikamach First Nation is one of the newest reserves. It is remote and has fewer than 600 residents.

Their approaches to housing program delivery are also different, but both have incorporated a method of evaluating current designs and feeding back the results into future design. Both communities also view occupants as “owners” of their houses over the long term.

All 14 communities emphasized that many of their design needs relate to larger family size and the family orientation of Aboriginal life. The overarching concern was a lack of space. There were examples of three generations living together (grandparents, their children and their children's children); sometimes two families of the same generation were living together in one house; sometimes relatives were visiting for an extended period.

None of the houses had been built to accommodate such large



numbers of people, resulting in cramped living conditions and, occasionally, feelings of inadequacy and distress at the inability to provide for family and friends.

Based on interviews with community members, a typical scenario is that, when a new house is built, it is allocated to a young family (for instance, two adults and two children.) But most family households continue to grow and the house quickly becomes too small. There is no housing market and thus no real possibility to move up.

Household size also increases for reasons other than having more children—relatives come to stay and there are cultural obligations to take them in. There are far fewer housing choices for seniors in most Aboriginal communities and grandparents tend to stay with their families.

Often, houses on a reserve tend to be the same or very similar, being always built for the young families on the waiting list. One design may be used repeatedly due to limited construction skills in the communities and a tendency to stick with the house that you know how to build. Thus, according to community members, it is rare to be offered a choice in the design of the house, other than for cosmetic features such as paint colour and floor finish. In most cases a standard house is offered or a choice is given to select one of two fixed designs.

### **More space**

Most houses in Aboriginal communities are built for four people, yet most family homes have more occupants. Generally, there are not enough bedrooms for each of the occupants to have their own space. Families would like to live in houses that are larger, include more bedrooms and have more than one bathroom. One bathroom for many people, especially children, is simply not enough.

Basements are often seen as a low-cost means of providing additional living space. However, most are not well-insulated or even heated and many basements have mold problems. Some people would like to eliminate basements completely and have only a crawl space. Some people suggested raised or split-level houses as a compromise.

Additional storage and cupboard space as well as space to accommodate one or more freezers is needed in many communities. In particular, those who hunt, fish, gather berries and preserve foods need more food-storage space. Many communities rely heavily on “country food,” as imported food is very expensive. Processing country food involves preparation space and considerable storage space as a year’s worth of food may be collected in just one season.

### **Flexible space**

The need for flexible interior space was mentioned in many of the interviews. Standard floor plans that divide a house into small rooms and hallways do not allow for comfortable family gatherings and, in many cases, create rooms that are not even large enough to allow the members of the household to eat together.

People would like the option of a more open floor plan that, for example, places the kitchen, living room and eating area within one large room. Such a large room could also be used for feasts, ceremonies, crafts and other traditional activities.

### **Backup heat source**

Communities in Northern Canada and remote communities are concerned with the reliability of their heat source. Many people who have a wood stove are thankful to have this backup heat source. Those who don’t often said they would like a wood stove.

### **Outdoor space and outbuildings**

For many communities, food preparation activities occur out of the house. Many people said they would like outdoor space associated with their house for outbuildings, such as sheds and smokehouses. Examples mentioned were space to set up poles for pounding and drying of animal skins, covered tables for cleaning fish and preparing berries, and racks for drying fish.

In addition to sheds and smokehouses, some would like to have a heated workroom attached to the house. Winter is the time for maintenance of equipment such as fishing gear, canoes and outboard motors. Often, repairs are required for snowmobiles or other equipment involved in winter food gathering and preparation.

### **Closed porches and mud rooms**

A closed porch or mud room protects the living space from adverse weather (such as wind gusting into the house) and helps to improve the energy efficiency of the house. It also provides space for people to enter the house, clean up after working outside, remove outdoor clothes and shoes, and store outdoor equipment.

### **Fire exits**

House fires are more common in First Nation communities than elsewhere in Canada and there was a concern with the safety of their homes and potential inability to escape during a fire. The concern relates to lack of proper emergency exits and with use of poor materials, resulting in jammed or iced-up windows and doors.

### **The needs of children**

The general lack of space in the houses resulted in a lack of space for children to play, study and socialize away from the parents. In addition, the small number and size of bedrooms in the homes requires children to share rooms and this was seen as a problem. People would like homes to have more indoor and outdoor places for children.

### **The needs of the elderly**

In Aboriginal communities many people live in the same house all their lives. As they grow older, their houses become less-suited to their needs. Examples mentioned included: steep stairs to enter the house, steep and occasionally winding stairs to the basement and second floor; narrow hallways and doors, small washrooms and storage areas that are out of reach. These create difficulties for elderly people, many of whom need walking aids.

Funds for major adaptation are scarce but those interviewed were divided on whether it was better to adapt homes to the needs of the elderly and add home-care services or to build specialized group housing for community-style living.



## Housing options for single people

In many Aboriginal communities people are on waiting lists for housing. When houses become available, they are generally given to families. In some cases, single people do not qualify for the waiting list.

This results in either young people leaving the community or increased crowding problems as they continue living with family. Some communities have started to build multiplex housing units to provide apartment-type living for single people. Many people interviewed emphasized the need to design houses that meet the needs of single people in their communities.

## DISCUSSION

### Why use local materials?

Community members' opinion was that using local materials for housing construction brought environmental, economic, social and cultural benefits to the community as a whole because:

- Local materials reflect the local environment and thus reinforce cultural identity.
- People identify more strongly with the houses, leading to increased pride and better care and maintenance.
- More money stays in the community. The use of local materials means less money needs to be spent externally and increases local employment through processing of the material.
- Fewer materials need to be transported over long distances and this benefits the environment.

#### But:

- Supply of materials at the local level is less reliable than at the regional level—catastrophic events can seriously affect a locality but are unlikely to affect a whole region.
- Local materials must be harvested in a sustainable manner for local resources to become a long-term option for housing materials. They need their own management plan.
- Housing construction with local materials, such as logs and straw bales, requires specialized skills. Local labour must be properly trained but skills acquired may not have wider application.
- Local political challenges may impede the use of local materials; community support is key.
- Federal funding requirements (for example, cost limits or compliance criteria) may impede the use of local materials and there may be no flexibility to exempt a requirement even when there is an offsetting circumstance.
- Economic analyses of the feasibility of using local materials and the potential benefits of local materials have not been done; therefore the true benefits of local materials are not yet understood. Such studies should include the true costs (including environmental and social) of the two options. It

should also include an analysis of how sensitive are any benefits to proximity, for instance, the distance between the local resource and the community.

### Why design for community preferences?

Community members were quite vocal and specific in describing desired improvements to the design of their housing. Interpreting their suggestions to uncover the fundamental reasons that underlie them is not easy, but there appear to be at least three:

1. A desire to maintain the old way of life as much as possible.
2. However, there is recognition that new ways must be accommodated.
3. A diverse collection of practical issues that deal with lifestyles associated with rural or remote areas, often with a severe climate.

The ways that participants suggested to make their interior and exterior living space more suited to their lives would increase pride, satisfaction, safety, and potentially improve social outcomes because:

- Larger homes would result in less crowding, less clutter and fewer accidents in the home whether fire-related or not.
- Flexible designs would mean that homes could be adapted for aging occupants, providing a safer and more satisfying environment.
- Housing designs that provide enough space to allow school children quiet study would lead to better school performance and educational outcomes.
- When the interior space is big enough or flexible enough to host, for example, large gatherings or feasts, community and family obligations are fulfilled, satisfaction is increased and distress reduced.
- When occupants' preferences help determine the design, the house becomes their house and there is pride and a sense of ownership.
- More space in which to pursue preparation of food and maintenance of associated equipment would lead to less physical stress on the physical environment and greater durability of the structure.

#### But:

- Meeting all the design preferences would mean that a house would have to serve multiple, sometimes contradictory, purposes. Trying to meet all these purposes in the design of houses as typically small as those on a reserve is not possible.
- The backlog of housing needs means that the emphasis is on the current needs of the applicant, not longer-term family growth.
- Limited funding means the emphasis is on the cheapest solution, not necessarily the best. Limited funding does not provide for much flexibility or choice in the type of house. One design, sometimes two, was all that was available.



- Most communities had few homegrown resources for developing customized new house designs or adapting existing designs. Waiting lists make it difficult to include community input in the housing designs.

## RECOMMENDATIONS FOR FUTURE RESEARCH

A constant factor underlying the interviews was the lack of analysable data or documentation behind the personal experiences and stories. There are thus many opportunities for gathering and processing information that would improve our understanding of the advantages and disadvantages of incorporating local materials and designs into community housing.

### Economic analysis of local materials

An analysis of the true cost of housing construction with local materials (logs and straw) would provide a better understanding of the benefits of using local materials. This full cost analysis should incorporate environmental, social and cultural costs and benefits in a way that reflects an Aboriginal world view and a holistic approach.

Included would be a life-cycle analysis (upstream and downstream environmental impacts of a product, project, or process over its entire life: extracting and processing of raw materials, manufacturing, transportation, use—reuse—maintenance, recycling and final disposal).

### Institutional analysis of impediments to innovation

Generally speaking, homegrown examples of use of materials or design development could be found only in a minority of communities. There may be many reasons for this but some hints from the interviews pointed to some possible institutional impediments: a lack of specialized building codes for innovative building materials, such as logs and straw bales, and a funding structure that makes it difficult to try new things or to plan beyond the most immediate pressing need. These concerns were not fully articulated during the interviews and could be better explored with focused research such as:

- Assessment of best practice guides on building with innovative materials with a view to endorsement for their use in housing programs, and
- Inclusion, within the regular cycle of program evaluation, of criteria relative to design used in Aboriginal housing. It could include questions such as: Is the portfolio profile as built under programs a good match to the community profile? Given that the majority of the housing that gets built is program-funded, it should match the community's housing needs.

## Develop housing design principles and plans

The research participants' housing design preferences could be used to develop new housing designs or adapt existing ones. There were no major differences in design preferences from one culture to another, suggesting that one set of design principles or a few basic plans could find wide currency. The design principles and plans could then be made available to communities and their housing contractors. The experiences of the two communities where designs had evolved with their housing delivery systems could also be documented in more detail and made available as an example of good practice.

**CMHC Project Manager:** Phil Deacon

**Research Report:** *Aboriginal Housing: Local Materials and Alternative Design Needs and Preferences*

**Research Consultant:** The Centre for Indigenous Environmental Resources (CIER), Winnipeg, Man.

## Housing Research at CMHC

Under Part IX of the *National Housing Act*, the Government of Canada provides funds to CMHC to conduct research into the social, economic and technical aspects of housing and related fields, and to undertake the publishing and distribution of the results of this research.

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